BOBBY JINDAL
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HAROLD LEGGETT, PH.D.
SECRETARY

# State of Louisiana

## DEPARTMENT OF ENVIRONMENTAL QUALITY
## ENVIRONMENTAL SERVICES

Certified Mail No.

Agency Interest (AI) No. 85652
Activity No. PER20060004

Mr. Paul Soileau
Responsible Official
PO Box 150
c/o Bldg 3502
Plaquemine, LA 70765-0150

RE: Prevention of Significant Deterioration (PSD) Permit, PSD-LA-659(M-2)
Plaquemine Cogeneration Plant
Dow Chemical Co, Plaquemine, Iberville Parish, Louisiana

Dear Mr. Davis:

Enclosed is your permit, PSD-LA-659(M-2). Construction of the proposed project is not allowed until such time as the corresponding Part 70 Operating Permit is issued.

Should you have any questions, contact Dustin Duhon of the Air Permits Division at (225) 219-3057.

Sincerely,

Cheryl Sonnier Nolan
Assistant Secretary

_____
Date

CSN:dcd

c: US EPA Region VI

**Agency Interest No. 85652**
**PSD-LA-659(M-2)**

# AUTHORIZATION TO CONSTRUCT AND OPERATE AN EXISTING FACILITY PURSUANT TO THE PREVENTION OF SIGNIFICANT DETERIORATION REGULATIONS IN LOUISIANA ENVIRONMENTAL REGULATORY CODE, LAC 33:III.509

In accordance with the provisions of the Louisiana Environmental Regulatory Code, LAC 33:III.509,

Dow Chemical Co.
PO Box 150 Bldg 3502 E
Plaquemine, LA 70765-0150

is authorized to operate the cogeneration power plant at the The Dow Chemical Co - Plaquemine Cogeneration Plant near

21255 Hwy 1
Gate 1 within Dow Chemical Co.
(a portion of)
Plaquemine, LA 70764

subject to the emissions limitations, monitoring requirements, and other conditions set forth hereinafter.

This PSD modification to permit No. PSD-LA-659(M-1) does not authorize construction of any additional new or modified units.

Signed this _____ day of _____, 2008.

Cheryl Sonnier Nolan
Assistant Secretary
Office of Environmental Services
Louisiana Department of Environmental Quality

**BRIEFING SHEET**

**PLAQUEMINE COGENERATION PLANT**
**AGENCY INTEREST NO.: 85652**
**DOW CHEMICAL CO.**
**PLAQUEMINE, IBERVILLE PARISH, LOUISIANA**
**PSD-LA-659(M-2)**

## PURPOSE

The Dow Chemical Company's Plaquemine Cogeneration Plant, is an existing electric and steam utility cogeneration facility. American Electric Power's (AEP) Ventures Lease Co. was the former owner and operator before the facility recently changed ownership on November 30, 2006. The facility also became contiguous upon the change in ownership with The Dow Chemical Company's Louisiana Division, Agency Interest No. 1409. The Dow Chemical Company's Plaquemine Cogeneration Plant currently operates under Permit No. 1280-00096-V1, issued October 3, 2003 and administratively amended March 21, 2005 and June 13, 2006.

This permit modification incorporates start-up / shut-down emissions from the power plant into the permit. This permit modification also incorporates a specific limitation of the sulfur content of the natural gas fuel burned in the turbines.

## RECOMMENDATION

Approval of the proposed modification and issuance of a permit.

## REVIEWING AGENCY

Louisiana Department of Environmental Quality, Office of Environmental Services, Air Permits Division

## PROJECT DESCRIPTION

This permit modification, PSD-LA-659(M-2), incorporates start-up/shut-down emissions from the power plant into this PSD permit. Start-up operations are defined as the time the unit starts combusting fuel until the turbines reach normal operational mode. The gas valves open to the vent stack when the reference temperature on the combustion turbine reaches a set temperature. The Continuous Emission Monitor System (CEMS) has a signal for when the unit reaches the normal operational set temperature. Shut-down is the reverse of Start-up, when the unit transfers out normal operational mode until no more fuel is combusted. Because the The Dow Chemical Company's Plaquemine Cogeneration Plant uses natural gas to fuel the turbines, only Nitrogen Oxides ($NO_X$), Carbon Monoxide (CO), and Volatile Organic Compounds (VOCs) are the pollutants of concern.

The Plaquemine Cogeneration Plant is comprised of four natural gas fired GE Frame 7 FA gas turbines, each with a nominal power rating of 170 MW. The turbines are equipped with dry low $NO_X$ combustors capable of achieving a $NO_X$ concentration of 9 parts per million on a dry volume basis, corrected to 15 percent oxygen (ppmvd @ 15% $O_2$) during non-peaking operations. Each turbine is also equipped with steam injection capabilities to boost power for peaking purposes. Steam is not used by the facility as a method of NOx control.

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Each gas turbine is equipped with a heat recovery steam generator (HRSG) and a supplementary-fired duct burner system. The duct burners are capable of firing pure natural gas, plant produced fuel gas provided by the host facility (composed of up to 60% hydrogen with a balance of methane), and/or a pure hydrogen stream provided by the host facility.

Each combined gas turbine/duct burner is outfitted with a selective catalytic reduction (SCR) system capable of achieving a $NO_X$ concentration of 5 ppmvd @ 15% $O_2$ on an annual average basis.

Due to mechanical considerations associated with firing pure hydrogen, each duct burner system is equipped with two sets of burners. One set will exclusively fire the pure hydrogen fuel stream, and the second will fire plant produced fuel gas, natural gas, or a blend of plant produced fuel gas and natural gas. The plant produced fuel gas and natural gas fuels will be fed to the duct burners in a common header system. Air augmentation of duct burners may be used during steam injection operating mode to insure stable combustion in the high moisture gas stream. Steam from the HRSGs is either supplied to the host or used to power a steam turbine generator. This generator has a nominal power rating of 200 MW.

A substantial technological limitation exists with respect to limiting start-up / shut-down emissions for combined cycle generating units. Start-up event duration is limited by the time required to adequately warm the heat recovery steam generator (HRSG), associated steam-handling systems and the steam turbine without imparting harmful thermal stresses to this equipment. As the combustion turbine begins operation, the exhaust gases which pass through the HRSG warm the water filled tubes, which begins the process of creating steam which drives the steam turbine.

Although the process of creating steam can begin relatively quickly, an abrupt introduction of steam to the steam turbine can result in uneven expansion of components. This uneven expansion of components can have severe adverse effects on its ability to operate, as well as creating a significant safety hazard. In general, the more time a combined cycle generating unit has been off-line, the more time is required to properly warm the steam cycle.

There are two types of start-up events depending on the length of time that the turbine is off-line between operational events. A cold start is associated with the turbine being off-line for a duration in which the turbine reaches ambient temperature, while a warm start occurs when a unit is down for less time than it takes the turbine to reach ambient temperatures.

Emission maximum lb/hr rate increases for $NO_X$, CO, and VOC are due to including the start-up/ shut-down emissions of the four turbines, EQT006, Combustion Gas Turbine GT-500, EQT007, Combustion Gas Turbine GT-600, EQT008, Combustion Gas Turbine GT-700, and EQT009, Combustion Gas Turbine GT-800. These emissions have existed at the site since initial start-up. The emission increases are not due to the installation or modification of any new equipment at the site.

Because the HRSGs are not fired until the turbines reach normal operation, the annual start-up/shut-down emissions are included on GRP006, SU/SD Operation Turbine GT-500, GRP007, SU/SD Operation Turbine GT-600, GRP008, SU/SD Operation Turbine GT-700, and GRP009, SU/SD

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**PSD-LA-659(M-2)**

Operation Turbine GT-800. Plaquemine Cogeneration Plant will demonstrate compliance with the permit limits for GRP005 through GRP009 by following the monitoring, recordkeeping, and calculation.

This permit also modifies the nitrogen oxides (NOx) limitation to allow the facility adequate time to make adjustments to the four turbines, EQT006, Combustion Gas Turbine GT-500, EQT007, Combustion Gas Turbine GT-600, EQT008, Combustion Gas Turbine GT-700, and EQT009, Combustion Gas Turbine GT-800 rather than have to shut them down to avoid an exceedance. As a result of these frequent shutdowns, Plaquemine Cogeneration Plant does not have enough CEMS data to justify a more appropriate NOx BACT limitation during normal operations. Therefore, the proposed permit allows a higher NOx BACT maximum pounds per hour limitation to allow for adequate time to make process adjustments to the equipment. In addition, the proposed permit requires Plaquemine Cogeneration Plant to collect continuous emissions data for a period of twelve (12) months and then submit a copy of the of the CEMS data to LDEQ. Upon review of the information submitted, LDEQ will make a determination regarding whether or not Plaquemine Cogeneration Plant must submit a permit modification application in order to incorporate this data into the permit. If a permit modification is determined to be appropriate, LDEQ will respond in writing indicating a deadline by which Plaquemine Cogeneration Plant shall be required to submit a permit modification application. The NOx BACT limit of 5 ppmvd @ 15% oxygen will not change as a result.

Ancillary equipment at the plant will include an 18-ton pressurized anhydrous ammonia storage vessel and a cooling tower that will primarily service the steam turbine generator. The Permits Division has reviewed BACT for the cooling tower and found that the combination of drift eliminators designed to achieve a drift rate of 0.005% and good operating practices remain appropriate.

Estimated emissions, in tons per year, are as follows:

| Pollutant | Before | After | Change |
|---|---|---|---|
| $PM_{10}$ | 559.40 | 559.40 | - |
| $SO_2$ | 214.80 | 214.80 | - |
| $NO_X$ | 854.40 | 854.40 | - |
| CO | 2503.20 | 2503.20 | - |
| VOC | 43.00 | 48.16 | + 5.16 |

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**PLAQUEMINE COGENERATION PLANT**
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**PLAQUEMINE, IBERVILLE PARISH, LOUISIANA**
**PSD-LA-659(M-2)**

| Pollutant | Baseline Actual Emissions | Projected Actual Emissions/PTE | Contemporaneous Changes | Net Emissions Increase | PSD de minimis | Review required? |
|---|---|---|---|---|---|---|
| PM | 559.40 | 559.40 | - | - | 25 | No |
| $PM_{10}$ | 559.40 | 559.40 | - | - | 15 | No |
| $SO_2$ | 214.80 | 214.80 | - | - | 40 | No |
| $NO_X$ | 854.40 | 854.40 | - | - | 40 | No |
| CO | 2503.20 | 2503.20 | - | - | 100 | No |
| VOC | 43.00 | 48.16 | - | 5.16 | 40 | No |
| Formaldehyde | 5.80 | 5.80 | - | - | - | No |
| Sulfuric Acid ($H_2SO_4$) | 2.00 | 2.00 | - | - | 7 | No |
| Ammonia ($NH_3$, as slip) | 631.50 | 631.50 | - | - | - | No |

## TYPE OF REVIEW

This PSD modification presents the review for Particulate Matter ($PM_{10}$), Nitrogen Oxide ($NO_X$; prior to December 21, 2001, the facility was subject to PSD review of NOx, however, the facility was not subject to Non-attainment New Source Review (NNSR) of NOx), Carbon Monoxide (CO), and Volatile Organic Compound (VOC) emissions from previous PSD modifications for the Plaquemine Cogeneration plant, in addition to a review for the start-up/shut-down emissions. In permits PSD-LA-659(M-1) and PSD-LA-659, $PM_{10}$, $NO_X$, and CO emissions exceeded the PSD significance levels. The review, in accordance with PSD regulations, performed in these permits is still applicable for the cooling towers, turbines, or duct burners. Emissions of LAC 33:III.Chapter 51-regulated toxic air pollutants (TAP) have been reviewed pursuant to the requirements of the Louisiana Air Quality Regulations.

## BEST AVAILABLE CONTROL TECHNOLOGY

Best Available Control Technology (BACT) has been selected for the start-up/shut-down emissions included in this PSD modification. The selection of control technology was based on the BACT analysis using a "top down" approach and included consideration of control of toxic materials. There is no change in the BACT analysis specified in the previous PSD Permits No. PSD-LA-659(M-1), issued October 3, 2003, and PSD-LA-659 dated December 26, 2001, for the cooling towers, turbines, or duct burners.

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**PSD-LA-659(M-2)**

**Alternate Operating Scenario: GT-500 - SU/SD Operation Turbine GT-500 (GRP010)**
**Alternate Operating Scenario: GT-600 - SU/SD Operation Turbine GT-600 (GRP011)**
**Alternate Operating Scenario: GT-700 - SU/SD Operation Turbine GT-700 (GRP012)**
**Alternate Operating Scenario: GT-800 - SU/SD Operation Turbine GT-800 (GRP013)**

$NO_X$: BACT is the use of Dry Low $NO_X$ (DLN) combustor technology and good engineering practices on the co-generation units.

CO: BACT is good engineering practice and combustion control on the co-generation unit.

VOC: BACT is good engineering practice and combustion control on the co-generation unit.

**CT-1 - Cooling Tower (EQT010)**

$PM_{10}$: BACT is the use of mechanical or induced draft fans with drift eliminators designed to achieve a drift rate of 0.005%, and good operating practices, as determined in PSD-LA-659(M-1). Maximum $PM_{10}$ emissions are limited to 1.40 lb/hr.

**Normal Operation: GT-500 – Combustion Gas Turbine (EQT006)**
**Normal Operation: GT-600 – Combustion Gas Turbine (EQT007)**
**Normal Operation: GT-700 – Combustion Gas Turbine (EQT008)**
**Normal Operation: GT-800 – Combustion Gas Turbine (EQT009)**

$PM_{10}$: BACT is the use of clean burning fuels (i.e., pipeline quality natural gas, plant produced fuel gas and hydrogen) and good combustion practices, as determined in PSD-LA-659(M-1).

$SO_2$: BACT is the use of low sulfur fuels with a maximum sulfur content of 5 grains/100 standard cubic feet (SCF) input.

$NO_X$: BACT is the use of Dry Low $NO_X$ (DLN) combustor technology with Selective Catalytic Reduction (SCR) and good engineering practices.

CO: Good design and operating practices, natural gas as fuel with DLN burners, are the appropriate BACT control technologies, good engineering practice and combustion control as determined in PSD-LA-659(M-1).

**DB-500 - HRSG Duct Burner (EQT012)**
**DB-600 - HRSG Duct Burner (EQT013)**
**DB-700 - HRSG Duct Burner (EQT014)**
**DB-800 - HRSG Duct Burner (EQT015)**

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Since these units can not operate separately from the gas turbines, it is not appropriate to evaluate BACT for these units separately from the gas turbines.

**Combined Cycle Operation: GasTurbine GT-500 with HRSG/DB-500 (GRP006)**
**Combined Cycle Operation: GasTurbine GT-600 with HRSG/DB-600 (GRP007)**
**Combined Cycle Operation: GasTurbine GT-700 with HRSG/DB-700 (GRP008)**
**Combined Cycle Operation: GasTurbine GT-800 with HRSG/DB-800 (GRP009)**

$PM_{10}$: BACT is the use of clean burning fuels (i.e., pipeline quality natural gas, plant produced fuel gas and hydrogen) to limit $PM_{10}$ emissions to 33.5 lbs/hr from combined turbine and HRSG duct burner vent streams using good combustion practices, as determined in PSD-LA-659(M-1).

$SO_2$: BACT is the use of low sulfur fuels with a maximum sulfur content of 5 grains/100 standard cubic feet (SCF) input. Maximum SO2 emissions are limited to 3.3 parts per million by volume (ppmv).

$NO_X$: BACT is the use of Dry Low $NO_X$ (DLN) combustor technology in the turbines and Selective Catalytic Reduction (SCR) add-on controls to limit emissions to 5 parts per million on a dry volume basis corrected to 15% oxygen (ppmvd @ 15%) on an annual average basis.

CO: Good design and operating practices, natural gas as fuel with DLN burners, are the appropriate BACT control technologies, as determined in PSD-LA-659(M-1). Maximum CO emissions are limited to 25 ppmv at 15% oxygen.

Proper design, operating, and maintenance practices are additional components of BACT for all pollutants.

## AIR QUALITY IMPACT ANALYSIS

Prevention of Significant Deterioration regulations require an analysis of existing air quality for those pollutants emitted in significant amounts from a proposed facility. The Industrial Source Complex, Short-Term, Version 3 (ISCST3) modeling performed for PSD-LA-659(M-1) is sufficient for this minor modification to the PSD permit. The modeling indicated maximum ground level concentrations of $PM_{10}$, $NO_X$ and CO are below the preconstruction monitoring exemption levels and the ambient significance levels. No preconstruction monitoring, increment analysis, or refined modeling is required for these pollutants. VOC increases were less than 50 tons per year; therefore no ambient impact analysis was required.

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**DOW CHEMICAL CO.**
**PLAQUEMINE, IBERVILLE PARISH, LOUISIANA**
**PSD-LA-659(M-2)**

| Pollutant | Avg. Period | ISCST3 Screen | PSD Significance Level | Preconstruction Level |
|---|---|---|---|---|
| $PM_{10}$ | Annual | 0.64 $\mu g/m^3$ | 1 $\mu g/m^3$ | - |
| | 24-hour | 4.37 $\mu g/m^3$ | 5 $\mu g/m^3$ | 10 $\mu g/m^3$ |
| $SO_2$ | Annual | 0.14 $\mu g/m^3$ | 1 $\mu g/m^3$ | - |
| | 24-hour | 2.19 $\mu g/m^3$ | 5 $\mu g/m^3$ | 13 $\mu g/m^3$ |
| | 3-hour | 11.8 $\mu g/m^3$ | 25 $\mu g/m^3$ | - |
| $NO_X$ | Annual | 0.13 $\mu g/m^3$ | 1 $\mu g/m^3$ | 14 $\mu g/m^3$ |
| CO | 8-hour | 27.6 $\mu g/m^3$ | 500 $\mu g/m^3$ | 575 $\mu g/m^3$ |
| | 1-hour | 111.9 $\mu g/m^3$ | 2000 $\mu g/m^3$ | - |

## ADDITIONAL IMPACTS

Soils, vegetation, and visibility will not be adversely impacted by the proposed facility, nor will any Class I area be affected. The project will not result in any significant secondary growth effects. Approximately 0 new permanent jobs will be created.

## PROCESSING TIME

| | |
|---|---|
| Application Dated: | August 18, 2006 |
| Application Received: | August 21, 2006 |
| Additional Information Dated: | May 11, 2007, June 15, 2007, and November 29, 2007 |
| Effective Completeness Date: | February 11, 2008 |

## PUBLIC NOTICE

A notice requesting public comment on the proposed project was published in *The Advocate*, Baton Rouge, Louisiana, on <<Date>>, 200x; and in <<*Local Paper*>>, <<City>>, Louisiana, on <<Date>>, 200x. Copies of the public notice were also mailed to individuals who have requested to be placed on the mailing list maintained by the Office of Environmental Services on <<Date>>, 200x. A proposed permit was also submitted to U.S. EPA Region VI on <<Date>>, 200x. All comments will be considered prior to a final permit decision.

# PRELIMINARY DETERMINATION SUMMARY

## PLAQUEMINE COGENERATION PLANT
## AGENCY INTEREST NO.: 85652
## DOW CHEMICAL CO.
## PLAQUEMINE, IBERVILLE PARISH, LOUISIANA
## PSD-LA-659(M-2)
## February 11, 2008

## I. APPLICANT

Dow Chemical Co.
PO Box 150
c/o Bldg 3502
Plaquemine, LA 70765-0150

## II. LOCATION

The Plaquemine Cogeneration Plant is located at 21255 Hwy 1, Gate 1 within Dow Chemical Co. (a portion of), Plaquemine, Louisiana. Approximate UTM coordinates are 669.879 kilometers East, 3353.371 kilometers North, zone 15.

## III. PROJECT DESCRIPTION

This permit modification incorporates start-up/shut-down emissions from the power plant into this PSD permit. Start-up operations are defined as the time the unit starts combusting fuel until the turbines reach normal operational mode. The gas valves open to the vent stack when the reference temperature on the combustion turbine reaches a set temperature. The Continuous Emission Monitor System (CEMS) has a signal for when the unit reaches the normal operational set temperature. Shut-down is the reverse of Start-up, when the unit transfers out normal operational mode until no more fuel is combusted. Because the The Dow Chemical Company's Plaquemine Cogeneration Plant uses natural gas to fuel the turbines, only Nitrogen Oxides ($NO_X$), Carbon Monoxide (CO), and Volatile Organic Compounds (VOCs) are the pollutants of concern.

The Plaquemine Cogeneration Plant is comprised of four natural gas fired GE Frame 7 FA gas turbines, each with a nominal power rating of 170 MW. The turbines are equipped with dry low $NO_X$ combustors capable of achieving a $NO_X$ concentration of 9 parts per million on a dry volume basis, corrected to 15 percent oxygen (ppmvd @ 15% $O_2$) during non-peaking operations. Each turbine is also equipped with steam injection capabilities to boost power for peaking purposes.

Each gas turbine is equipped with a heat recovery steam generator (HRSG) and a supplementary-fired duct burner system. The duct burners are capable of firing pure natural gas, plant produced fuel gas provided by the host facility (composed of up to 60% hydrogen with a balance of methane), and/or a pure hydrogen stream provided by the host facility.

Each combined gas turbine/duct burner is outfitted with a selective catalytic reduction (SCR) system capable of achieving a $NO_X$ concentration of 5 ppmvd @ 15% $O_2$ on an annual average basis.

Due to mechanical considerations associated with firing pure hydrogen, each duct burner system is equipped with two sets of burners. One set will exclusively fire the pure hydrogen fuel stream, and the second will fire plant produced fuel gas, natural gas, or a blend of plant produced fuel gas and natural gas. The plant produced fuel gas and natural gas fuels will be fed to the duct burners in a common header system. Air augmentation of duct burners may be used during steam injection operating mode to insure stable combustion in the high moisture gas stream. Steam from the HRSGs is either supplied to the host or used to power a steam turbine generator. This generator has a nominal power rating of 200 MW.

A substantial technological limitation exists with respect to limiting start-up / shut-down emissions for combined cycle generating units. Start-up event duration is limited by the time required to adequately warm the heat recovery steam generator (HRSG), associated steam-handling systems and the steam turbine without imparting harmful thermal stresses to this equipment. As the combustion turbine begins operation, the exhaust gases which pass through the HRSG warm the water filled tubes, which begins the process of creating steam which drives the steam turbine.

Although the process of creating steam can begin relatively quickly, an abrupt introduction of steam to the steam turbine can result in uneven expansion of components. This uneven expansion of components can have severe adverse effects on its ability to operate, as well as creating a significant safety hazard. In general, the more time a combined cycle generating unit has been off-line, the more time is required to properly warm the steam cycle.

There are two types of start-up events depending on the length of time that the turbine is off-line between operational events. A cold start is associated with the turbine being off-line for a duration in which the turbine reaches ambient temperature, while a warm start occurs when a unit is down for less time than it takes the turbine to reach ambient temperatures.

Emission maximum lb/hr rate increases for $NO_X$, CO, and VOC are due to including the start-up/ shut-down emissions of the four turbines, EQT006, Combustion Gas Turbine GT-500, EQT007, Combustion Gas Turbine GT-600, EQT008, Combustion Gas Turbine GT-700, and EQT009, Combustion Gas Turbine GT-800. These emissions have existed at the site since initial start-up. The emission increases are not due to the installation or modification of any new equipment at the site.

Because the HRSGs are not fired until the turbines reach normal operation, the annual start-up/shut-down emissions are included on GRP006, SU/SD Operation Turbine GT-500, GRP007, SU/SD Operation Turbine GT-600, GRP008, SU/SD Operation Turbine GT-700, and GRP009, SU/SD Operation Turbine GT-800. Plaquemine Cogeneration Plant will demonstrate compliance with the permit limits for GRP005 through GRP009 by following the monitoring, recordkeeping, and reporting requirements.

**PRELIMINARY DETERMINATION SUMMARY**

**PLAQUEMINE COGENERATION PLANT**
**AGENCY INTEREST NO.: 85652**
**DOW CHEMICAL CO.**
**PLAQUEMINE, IBERVILLE PARISH, LOUISIANA**
**PSD-LA-659(M-2)**
**February 11, 2008**

Ancillary equipment at the plant will include an 18-ton pressurized anhydrous ammonia storage vessel and a cooling tower that will primarily service the steam turbine generator. The Air Permits Division has reviewed BACT for the cooling tower and found that the combination of drift eliminators designed to achieve a drift rate of 0.005% and good operating practices remain appropriate.

Estimated emissions, in tons per year, are as follows:

| Pollutant | Emissions | PSD de minimis | Review required? |
|---|---|---|---|
| PM | 559.40 | 25 | No |
| $PM_{10}$ | 559.40 | 15 | No |
| $SO_2$ | 214.80 | 40 | No |
| $NO_X$ | 854.40 | 40 | No |
| CO | 2503.20 | 100 | No |
| VOC | 43.00 | 40 | No |
| Formaldehyde | 5.80 | - | No |
| Sulfuric Acid ($H_2SO_4$) | 2.00 | - | No |
| Ammonia ($NH_3$, as slip) | 631.50 | - | No |

| Pollutant | Baseline Actual Emissions | Projected Actual Emissions/PTE | Contemporaneous Changes | Net Emissions Increase | PSD de minimis | Review required? |
|---|---|---|---|---|---|---|
| PM | 559.40 | 559.40 | - | - | 25 | No |
| $PM_{10}$ | 559.40 | 559.40 | - | - | 15 | No |
| $SO_2$ | 214.80 | 214.80 | - | - | 40 | No |
| $NO_X$ | 854.40 | 854.40 | - | - | 40 | No |
| CO | 2503.20 | 2503.20 | - | - | 100 | No |
| VOC | 43.00 | 48.16 | - | 5.16 | 40 | No |
| Formaldehyde | 5.80 | 5.80 | - | - | - | No |
| Sulfuric Acid ($H_2SO_4$) | 2.00 | 2.00 | - | - | 7 | No |
| Ammonia ($NH_3$, as slip) | 631.50 | 631.50 | - | - | - | No |

## IV. SOURCE IMPACT ANALYSIS

A proposed net increase in the emission rate of a regulated pollutant above de minimis levels for new major or modified major stationary sources requires review under Prevention of

Significant Deterioration regulations, 40 CFR 52.21. PSD review entails the following analyses:

A. A determination of the Best Available Control Technology (BACT);

B. An analysis of the existing air quality and a determination of whether or not preconstruction or post-construction monitoring will be required;

C. An analysis of the source's impact on total air quality to ensure compliance with the National Ambient Air Quality Standards (NAAQS);

D. An analysis of the PSD increment consumption;

E. An analysis of the source related growth impacts;

F. An analysis of source related growth impacts on soils, vegetation, and visibility;

G. A Class I Area impact analysis; and

H. An analysis of the impact of toxic compound emissions.

## A. BEST AVAILABLE CONTROL TECHNOLOGY

Under current PSD regulations, an analysis of "top down" BACT is required for the control of each regulated pollutant emitted from a new major source in excess of the specified significant emission rates. The top down approach to the BACT process involves determining the most stringent control technique available for a similar or identical source. If it can be shown that this level of control is infeasible based on technical, environmental, energy, and/or cost considerations, then it is rejected and the next most stringent level of control is determined and similarly evaluated. This process continues until a control level is arrived at which cannot be eliminated for any technical, environmental, or economic reason. A technically feasible control strategy is one that has been demonstrated to function efficiently on identical or similar processes. Additionally, BACT shall not result in emissions of any pollutant which would exceed any applicable standard under 40 CFR Parts 60 and 61.

For this project, BACT analyses are required for $PM_{10}$, $SO_2$, $NO_X$, and CO emissions from both the cogeneration unit turbines and duct burners. Additionally, a BACT analysis is required for $PM_{10}$ emissions from the cooling tower. Where $PM_{10}$ is addressed in the BACT analysis, it is assumed that particulate matter (PM) is also being considered.

The BACT analyses address the gas turbines, and in the case of the analysis for $PM/PM_{10}$ emissions, the gas turbines and the cooling tower. Exit gas from the turbines will be routed to duct burners, where additional fuel will be burned and the heat recovered in the heat recovery

steam generators. Potential controls for PM/$PM_{10}$, $SO_2$, $NO_X$, and CO emissions from the duct burners are the same as those discussed for the combustion turbines. Because the exhaust gas streams from the turbines and duct burners will be combined prior to entering a control device, and due to the similarities in the streams, the assessment of technical and economic feasibility of each control method does not differ.

**BACT analyses for PM/PM10**

**Combustion Turbines/Duct Burners**
**EQT Nos.: 006, 007, 008, 009, 012, 013, 014, 015**

BACT for $PM_{10}$ as determined in Permit Nos. PSD-LA-659 and PSD-LA-659(M-1) is the use of clean burning fuels (i.e., pipeline quality natural gas, plant produced fuel gas, and hydrogen) to limit particulate emissions from the combined gas turbine and duct burner vent streams to 33.5 lb/hr. This is also determined in Permit No. PSD-LA-659(M-2) to be BACT during periods of startup and shutdown.

**Cooling Tower**
**EQT No.: 010**

BACT for $PM_{10}$ emissions as determined in Permit Nos. PSD-LA-659 and PSD-LA-659(M-1) is drift eliminators designed to achieve a drift rate of 0.005%, as well as good operating practices.

**BACT analyses for SO2**

**Combustion Turbines/Duct Burners**
**EQT Nos.: 006, 007, 008, 009, 012, 013, 014, 015**

BACT for $SO_2$ emissions as determined in Permit Nos. PSD-LA-659 and PSD-LA-659(M-1) is the use of clean burning fuels with a maximum sulfur content of 5 grains/100 scf. This is also determined in Permit No. PSD-LA-659(M-2) to be BACT during periods of startup and shutdown.

**BACT analyses for NOx**

**Combustion Turbines/Duct Burners**
**EQT Nos.: 006, 007, 008, 009, 012, 013, 014, 015**

BACT for $NO_X$ emissions as determined in Permit Nos. PSD-LA-659 and PSD-LA-659(M-1) is the combination of dry low $NO_X$ burners and selective catalytic reduction add-on controls which limits $NO_X$ emissions to 5 ppmvd @ 15% $O_2$ on an annual average basis. This is also determined in Permit No. PSD-LA-659(M-2) to be BACT during periods of startup and shutdown.

**BACT analyses for CO**

**Combustion Turbines/Duct Burners**
**EQT Nos.: 006, 007, 008, 009, 012, 013, 014, 015**

BACT for CO emissions as determined in Permit Nos. PSD-LA-659 and PSD-LA-659(M-1) is good combustion practices that limit such emissions from the combined flue gases to 25 ppmvd @ 15% $O_2$. This is also determined in Permit No. PSD-LA-659(M-2) to be BACT during periods of startup and shutdown.

## B. ANALYSIS OF EXISTING AIR QUALITY

Prevention of Significant Deterioration regulations require an analysis of existing air quality for those pollutants to be emitted in significant amounts from a proposed facility. $PM_{10}$, $SO_2$, $NO_X$, and CO are pollutants of concern in this case.

ISCST3 modeling of $PM_{10}$, $NO_X$, and CO emissions from the proposed project indicates that the maximum offsite ground level concentrations of these pollutants will be below their respective PSD significance levels and preconstruction monitoring levels. Therefore, pre-construction monitoring, refined NAAQS modeling, and increment consumption analyses were not required.

However, the model predicted that $SO_2$ emissions would exceed the significance level, but not the preconstruction monitoring level, for the 3-hour and 24-hour averaging period; consequently, refined NAAQS modeling and increment consumption analyses were required, but preconstruction monitoring was not.

VOC emissions from the proposed station will be less than 100 tons per year. An ambient air quality analysis for ozone and preconstruction monitoring are not required.

| Pollutant | Averaging Period | ISCST3 Screen | PSD Significance Level | Preconstr. Level |
|---|---|---|---|---|
| $PM_{10}$ | Annual | 0.64 $\mu g/m^3$ | 1 $\mu g/m^3$ | - |
| | 24-hour | 4.37 $\mu g/m^3$ | 5 $\mu g/m^3$ | 10 $\mu g/m^3$ |
| $SO_2$ | Annual | 0.14 $\mu g/m^3$ | 1 $\mu g/m^3$ | - |
| | 24-hour | 2.19 $\mu g/m^3$ | 5 $\mu g/m^3$ | 13 $\mu g/m^3$ |
| | 3-hour | 11.8 $\mu g/m^3$ | 25 $\mu g/m^3$ | - |
| $NO_X$ | Annual | 0.13 $\mu g/m^3$ | 1 $\mu g/m^3$ | 14 $\mu g/m^3$ |

| | | | | |
|---|---|---|---|---|
| CO | 8-hour | 27.6 $\mu g/m^3$ | 500 $\mu g/m^3$ | 575 $\mu g/m^3$ |
| | 1-hour | 111.9 $\mu g/m^3$ | 2000 $\mu g/m^3$ | - |

## C. NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) ANALYSIS

Because ISCST3 modeling analyses indicated concentrations of each pollutant would be below its PSD ambient significance level, refined NAAQS modeling was not required.

## D. PSD INCREMENT ANALYSIS

Because ISCST3 modeling analyses indicated concentrations of each pollutant would be below its PSD ambient significance level, PSD increment modeling was not required.

## E. SOURCE RELATED GROWTH IMPACTS

Operation of this facility is not expected to have any significant effect on residential growth or industrial/commercial development in the area of the facility. No significant net change in employment, population, or housing will be associated with the project. As a result, there will not be any significant increases in pollutant emissions indirectly associated with Dow Chemical Co's proposal. Secondary growth effects will include temporary construction related jobs and approximately 0 permanent jobs.

## F. SOILS, VEGETATION, AND VISIBILITY IMPACTS

There will be no significant impact on area soils, vegetation, or visibility.

## G. CLASS I AREA IMPACTS

Louisiana's Breton Wildlife Refuge the nearest Class I area, is over 100 kilometers from the site, precluding any significant impact.

## H. TOXIC EMISSIONS IMPACT

The selection of control technology based on the BACT analysis included consideration of control of toxic emissions.

The Plaquemine Cogeneration Plant will emit formaldehyde as a result of the combustion of natural gas, ammonia from the operation of the SCR system, and sulfuric acid. Per §5105.B.2, electric utility steam-generating units (duct burners) are not regulated under Subchapter A of LAC 33:III.Chapter 51. E emissions from the combustion of Group 1 virgin